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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/704,539 | 11/03/2000 | Ken Kitamura | 44084-479 | 4655 |

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EXAMINER

KAO, CHIH CHENG G

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/704,539

Applicant(s)

KITAMURA ET AL.

Examiner

Chih-Cheng Glen Kao

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,8-12,15-18 and 20 is/are rejected.
- 7) ☒ Claim(s) 3,4,6,7,13,14 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 3 is objected to because of the following informalities. In line 1, photoelectric is misspelled as "ohotoelectric". Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 8-11, 15, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakayama et al. (US Patent 6,157,072) in view of Takasaki et al. (US patent 4980736).

3. Regarding claims 1, 11, 15, 16 and 20, Nakayama et al. discloses a solid state sensing device and photoelectric conversion device (Title) having a layered structure comprising or consisting:

an amorphous silicon layer to absorb light and generate carriers (Fig. 3, #30b, 32b),

an amorphous silicon carbide of p-type conductivity layer (Fig. 3, #30a, 32a),

an amorphous silicon nitride (col. 20, lines 34-46) of n-type conductivity layer (Fig. 3, #30c, 32c)

a metal substrate (col. 20, lines 48-55),

accumulation units and output (col. 15, lines 63-65).

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However, Nakayama et al. does not seem to specifically disclose silicon as a multiplication layer and inhibiting layers.

Takasaki et al. teaches silicon as a multiplication layer (col. 4, lines 64-65) and inhibiting layers (col. 1, lines 35-40, and col. 4, lines 64-69).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have the multiplication layer and inhibiting layers of Takasaki et al. with the device of Nakayama et al., since one would be motivated to have low dark current as shown by Takasaki et al. (col. 3, lines 17-20, and col. 4, lines 58-69).

4. Regarding claims 8-10, Nakayama et al. in view of Takasaki et al. suggest a device as recited above. However, Nakayama et al. does not seem to specifically disclose a polycrystalline, microcrystalline, or monocrystalline substrate.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have those substrates with the device of Nakayama et al. in view of Takasaki et al., which is explained as follows. Since these materials are considered conventional functionally equivalent as relatively inflexible materials, it would have been within routine skill for one having ordinary skill in the art to place the device on any material that was inflexible. It would have been within routine skill to substitute one type of material for another as shown by Nakayama et al. (col. 20, lines 48-56). Lacking any criticality, one would be motivated to use those materials because they don't bend.

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5. Claims 2, 5, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakayama et al. in view of Takasaki et al. as applied to claims 1 and 16, and further in view of Deane et al. (US patent 6064091). Nakayama et al. in view of Takasaki et al. suggest a device as recited above. However, Nakayama et al. does not seem to specifically disclose a ratio C/Si of 1.5 or lower and a ratio N/Si of 0.8 or lower.

Deane et al. teaches a ratio C/Si of 1.5 or lower and a ratio N/Si of 0.8 or lower. (col. 5, lines 27-31).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the ratios of Deane et al. with the device of Nakayama et al. in view of Takasaki et al., since one would be motivated to have the band gap to allow excess carriers to move easily as shown by Deane et al. (col. 2, lines 35-41).

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakayama et al. in view of Takasaki et al. as applied to claim 1, and further in view of Fukuda et al. (US patent 5635327). Nakayama et al. in view of Takasaki et al. suggest a device as recited above. However, Nakayama et al. does not seem to specifically disclose boron in the carrier generation layer.

Fukuda et al. teaches boron in the carrier generation layer (col. 4, lines 48-57).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the boron of Fukuda et al. with the device of Nakayama et al. in view of Takasaki et al., since one would be motivated to control dark resistance as shown by Fukuda et al. (col. 4, lines 48-57) which is related to the dark current.

Allowable Subject Matter

7. Claims 3, 4, 6, 7, 13, 14, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 3, prior art does not specifically disclose or fairly suggest a photoelectric conversion device including an energy level discontinued on a conduction band side and equal on a valence band side in combination with all the limitations in the claim, intervening claims, and base claim.

Regarding claim 4, prior art does not specifically disclose or fairly suggest a photoelectric conversion device including holes prevented from flowing out and electrons from coming in, in combination with all the limitations in the claim, intervening claims, and base claim.

Regarding claim 6, prior art does not specifically disclose or fairly suggest a photoelectric conversion device including an energy level discontinued on a valence band side and equal on a conduction band side in combination with all the limitations in the claim, intervening claims, and base claim.

Regarding claim 7, prior art does not specifically disclose or fairly suggest a photoelectric conversion device including electrons prevented from flowing out and holes from coming in, in combination with all the limitations in the claim, intervening claims, and base claim.

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Regarding claims 13, 14, and 19, prior art does not specifically disclose or fairly suggest a photoelectric conversion device including an electric field reducing layer in combination with all the limitations in the claim and base claim.

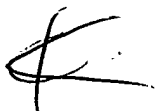
8.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (703) 605-5298. The examiner can normally be reached on M - Th (8 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



gk
June 30, 2002



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